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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/517,179

12/07/2004

Hideaki Takeda

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GREER, BURNS & CRAIN
300 S WACKER DR
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CHICAGO, IL 60606

EXAMINER

HOANG, ANN THI

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/517,179	Applicant(s) TAKEDA, HIDEAKI	
	Examiner ANN T. HOANG	Art Unit 2836	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 February 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 23-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 23-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 December 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 22-27 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe et al. (US 2002/0140401) in view of Chen et al. (US 6,958,671).

Regarding claim 22, Watanabe et al. discloses a direct current cutoff switch (104), comprising:

a first fixed contact (1017) which is formed on a first terminal unit (1011) being inside a housing (1010) to be connected to a first power supply side of an external circuit;

a second fixed contact (1017) which is formed on a second terminal unit (1011) being inside a housing (1010) to be connected to a first load side contact of the external circuit and which is disposed next to the first fixed contact (1017);

first and second movable contacts (1016) disposed in positions facing the first and second fixed contacts (1017), respectively;

a movable plate (1014) with conductivity, a center portion of which is fixed to a supporting member (1018) of the housing (1010), having tips of the movable plate

(1014) being movable upward and downward supporting the first and second movable contacts (1016);

a bimetal which is engaged in the movable plate (1014) and moves the tips of the movable plate (1014) upward and downward by reversing a curve direction using a predetermined temperature, and separates the first and second movable contacts (1016) from the first and second fixed contacts (1017); and

a PTC (1015) to be connected between the movable plate (1014) an interconnection part which connects a second power supply side contact of the external circuit to a second load side contact of the external circuit.

See Figs. 10 and 16 and paragraphs [0039], [0045] and [0047]. Since current cutoff switch (104) is applied to a battery pack, it is understood that it is cutting off direct current. An interconnection part between a second power supply side contact and a second load side contact of the external circuit is shown as the connection between negative battery terminal (161) and negative output terminal (1621) in Fig. 16. The reference does not disclose that the movable plate (1014) has a first tip that is fixed to a supporting member of the housing (1010), a second tip opposite the first tip, or that the switch (104) is configured so that when the first and second movable contacts (1016) are away from the first and second fixed contacts (1017), a distance between the second movable contact (1016) and the second fixed contact (1017) becomes greater than a distance between the first movable contact (1016) and the first fixed contact (1017).

However, Watanabe et al. discloses an alternative embodiment of the direct

current cutoff switch (84) having a tip of the movable plate (814) that is fixed to a supporting member of the housing (810) and a second tip opposite the first tip being movable upward and downward supporting a movable contact (816). See Fig. 8 and paragraph [0043]. It would have been obvious to one of ordinary skill in the art at the time of the invention to fix a tip, rather than a center portion, of the movable plate to a supporting member of the housing as a matter of design choice, since fixing the movable plate to a supporting member of the housing in either location would effectively secure the movable plate in position while providing flexibility to allow the direct current cutoff switch to open and close.

Furthermore, Chen et al. discloses a current cutoff switch (10) that is configured so that a second movable contact (24) is first separated from a second fixed contact (22) before a first movable contact (20) is separated from a first fixed contact (18). This is due to the asymmetrical shape of movable plate (30), to which first and second movable contacts (20, 24) are attached. See Fig. 2 and 4:7-50. Thus, when first and second movable contacts (20, 24) are away from first and second fixed contacts (18, 22), a distance between the second movable contact (24) and the second fixed contact (22) becomes greater than a distance between the first movable contact (20) and the first fixed contact (18). It would have been obvious to one of ordinary skill in the art at the time of the invention to configure the current cutoff switch of Watanabe et al. to have an asymmetrical movable plate, such as that of Chen et al., to ensure a sequential connection/separation of the two sets of contacts and a difference in distances between

the two sets of contacts during opening of the switch, in order to reduce contact resistance and arcing between contacts.

Regarding claim 24, Watanabe et al. in view of Chen et al. discloses all the limitations of claim 23, as discussed above. The references do not disclose that a contact opening voltage at the time of cutoff of a large direct current by opening the first movable contact is located in the range of 28V to 48V.

However, the range of the contact opening voltage at the time of cutoff would depend on factors such as the value of the PTC or the power supply voltage. It would have been obvious to one of ordinary skill in the art at the time of the invention to design the direct current cutoff switch using a PTC value and power supply voltage to produce the desired contact opening voltage, since it has been held that, where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claim 25, Watanabe et al. in view of Chen et al. discloses all the limitations of claim 23, as discussed above. The references do not disclose that said PTC has an upper limit voltage in which range no thermal runaway occurs or a voltage/current characteristic where a lower peak is in the range of 80V or more.

However, the range of upper limit voltages in which no thermal runaway occurs or the lower peak of a voltage/current characteristic would depend on factors such as the value of the PTC or the power supply voltage. It would have been obvious to one of ordinary skill in the art at the time of the invention to design the direct current cutoff switch using a PTC value and power supply voltage to produce the desired

voltage/current characteristic and avoid thermal runaway, since it has been held that, where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claim 26, Watanabe et al. in view of Chen et al. discloses all the limitations of claim 23, as discussed above. The references do not disclose that said PTC has a voltage/current characteristic such that the position of peak current against voltage in a range where no thermal runaway occurs is located in a range of 2V to 20V.

However, the position of peak current against voltage in a range where no thermal runaway occurs would depend on factors such as the value of the PTC or the power supply voltage. It would have been obvious to one of ordinary skill in the art at the time of the invention to design the direct current cutoff switch using a PTC value and power supply voltage to produce the desired voltage/current characteristic, since it has been held that, where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claim 27, Watanabe et al. in view of Chen et al. discloses all the limitations of claim 23, as discussed above. Watanabe et al. does not disclose that said external circuit is a circuit with a rating of direct current 42V or a circuit for driving an induction load.

However, Chen et al. discloses that current cutoff switch (10) is applicable to a motor, which would be considered to be an induction load. See 1:18-20. It would have

been obvious to one of ordinary skill in the art at the time of the invention to apply the direct current cutoff switch of Watanabe et al. in view of Chen et al. to a circuit for driving an induction load, as disclosed by Chen et al., in order to provide a means for cutting off direct current to an induction load. In this combination, said external circuit would be a circuit for driving an induction load.

Regarding claim 29, Watanabe et al. discloses that said second terminal unit (1011) having the second fixed contact (1017) is a terminal unit connected to an external circuit, but not that the external circuit is on a load side. See paragraph [0036].

However, Chen et al. discloses that current cutoff switch (10) is applicable to a motor, which would be considered to be an induction load. See 1:18-20. It would have been obvious to one of ordinary skill in the art at the time of the invention to apply the direct current cutoff switch of Watanabe et al. in view of Chen et al. to a circuit for driving an induction load, as disclosed by Chen et al., in order to provide a means for cutting off direct current to an induction load. In this combination, said external circuit would be on a load side.

3. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe et al. (US 2002/0140401) in view of Chen et al. (US 6,958,671), as applied to claim 23 above, and further in view of Limitor AG (DE 3128090).

Regarding claim 28, Watanabe et al. in view of Chen et al. discloses all the limitations of claim 23, as discussed above. The references do not disclose that in said PTC, the Curie temperature is set to a value higher than the operating temperature of the bi-metal.

However, Limitor AG discloses a current cutoff switch in which the Curie temperature of a PTC (16) is set to a value higher than the operating temperature of a bi-metal. See abstract. It would have been obvious to one of ordinary skill in the art at the time of the invention to set the Curie temperature of the PTC to a value higher than the operating temperature of the bi-metal, as disclosed by Limitor AG, in the direct current cutoff switch of Watanabe et al. in view of Chen et al. so that the PTC would not limit current normally delivered between the terminal units, but would only limit current to suppress arcing after the bi-metal caused the direct current cutoff switch to open.

Response to Arguments

4. Applicant's arguments filed 02/07/08 have been fully considered but they are not persuasive. Examiner asserts that Watanabe et al. in view of Chen et al. discloses a cut-off switch in which the first and second contacts are fixed, and the distance between the second movable contact and the second fixed contact is greater than the distance between the first movable contact and the first fixed contact when the first and second movable contacts are away from the first and second contacts, as cited in claim 23. Configuring the current cutoff switch of Watanabe et al. to have an asymmetrical movable plate, such as that of Chen et al., would provide this limitation.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANN T. HOANG, whose telephone number is 571-272-

Art Unit: 2836

2724. The examiner can normally be reached on Mon-Thurs and every other Fri, 8 a.m. to 6 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Sherry, can be reached at 571-272-2084. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Michael J Sherry/
Supervisory Patent Examiner, Art Unit 2836

ATH
6/21/08